CHARTER RENEWAL APPLICATION

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity on Supercomputing. The SIAM Activity Group (or SIAG) to which this renewal applies was originally formed under the aegis of SIAM on July 16, 1984 by the SIAM Council and July 17, 1984 by the SIAM Board of Trustees. Its initial operating period began January 1, 1985 and ended December 31, 1987.. Its charter has been renewed by the Council and Board eight times thereafter. This SIAG has 888 members as of December 31, 2010; of these, 383 were students.

According to its Rules of Procedure, the objectives of the SIAG are provide an environment for interaction between developers of large-scale applications programs, applied mathematicians, algorithm designers, and computer architects, to foster the development of analytic methods, efficient algorithms, and applications software in context with advances in computer architecture as applied to high performance computing.

Its proposed functions are to:

1) Organize minisymposium at the SIAM Annual meeting in years when there is no Parallel Processing Conference.
2) Organize a track of at least six minisymposia at the SIAM Annual Meeting at least once every five years.
3) Organize a biennial SIAM Conference on Parallel Processing.

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The SIAG has complemented SIAM's activities and supported its proposed functions. The answers to the questions below indicate how this was accomplished and what the officers propose as the future directions for the SIAG.

1. How is the field covered by the activity group doing? Is it growing, is the focus shifting? What have been the significant advances over the last [two/three] years?

Industry began hitting the limits on exponential growth of performance on individual microprocessors many years ago and is now building commodity processors with increasing numbers of cores. Nearly every SIAG/SC officer candidate statement included a mention of the "ubiquitous" nature of parallel computing. Every new machine now has more than one core. Two years ago, Mike Heroux wrote "The supercomputing and larger parallel computing fields that SIAG/SC represent are experiencing a kind of intense interest that is probably as great as ever in the history of this SIAG." This is still true. There are parallel algorithmic and architectural challenges at the small scale (single desktops, laptops, and servers), middle scale (such as Tilera processors), large scale (current supercomputers), to future exascale systems.

Although there is still effort to improve the performance of algorithms for GPUs, and to increase the number of applications that run well on such architectures, there has been particular work in recent years on multicore and manycore algorithms and on algorithms for cloud computing based on the map-reduce paradigm such as Hadoop. A growing area for SIAG/SC is large data problems such as storage management, summaries, streaming computations, and general data mining, including complex network analysis.

Designing an exascale computer and making it programmable is still a huge challenge that will drive the highest end of parallel computing in the near future. Recent efforts in hardware/software co-design expose challenges in programming models, architecture, algorithms, applications, and operating systems. There is an increased focus on reliability/resilience in computer software.

2. How is the activity group doing? Is it remaining vibrant? Is the size of the SIAG stable or increasing? How is the SIAG keeping up with the changes in the field? How are the broader interests of SIAM reflected in the activities of the SIAG?

This SIAG is healthy. Membership grew from 710 members on December 31, 2008 to 888 members on December 31, 2010, a 25% increase. PP10 had strong participation with 406 attendees, including special participation by

Seattle industry and the University of Washington. As described above, SIAG/SC's mission space involves fundamental issues in parallel computing which are now fundamental issues in all computing. This SIAG is focused on algorithm development and performance analysis, both mathematical and experimental, on parallel architectures, system software, runtime systems, and user tools. Although some understanding of parallelism is important for many extreme-scale applications, this SIAG's focus explicitly on all things parallel is unique, and complementary to the rest of SIAM's interests.

3. Please list conferences/workshops the activity group has sponsored or co-sponsored over the past [two/three] years, and give a brief (one sentence or phrase) indication of the success or problems with each.

SIAG/SC has hosted the SIAM Conference on Parallel Processing 2010 (SIAM PP10) in Seattle, WA and SIAG/SC-hosted SIAM PP08 in Atlanta, GA both had very healthy attendance and active conference participation. See http://www.siam.org/meetings/archives.php#PP for the list of less recent PP conferences.
SIAG/SC members organized special supercomputing-related activities at the SIAM Conference on Computational Science and Engineering 2011 (CSE11). Specifically, SIAG/SC members organized or participated in 24 minisymposia featuring parallel computing topics, gave 14 other parallel-computing minisymposia talks, 7 contributed talks, and 3 posters.

4. Please indicate the number of minisymposia directly organized by the activity group at the last [two/three] SIAM Annual Meetings. When did the SIAG last organize a track of minisymposia at an annual meeting?

The activity group last had an official track in the SIAM Annual Meeting in Denver in 2009. Although there has been strong SIAG/SC participation in AN10 and ICIAM 2011, it is time for another formal track. We will request a track in AN13.

5. Please indicate other activities sponsored by the activity group, to include newsletters, prizes and web sites. Have each of these been active and successful?

SIAG/SC maintains a website. We have a monitored mail list to which forwards postings announcing positions, workshops/conferences, books, and other news items that might be of interest to SIAG/SC members. There have been 80 posts to this email list so far in 2011. SIAG/SC sponsors two prizes: one for a senior researcher and one for a junior researcher. The first two prizes were presented at PP10. There will be another 2 given at PP12.

6. What activities are planned and proposed for the next period of the charter? Please describe scheduled and suggested future activities in detail.

- SIAM Annual Meeting AN12: Several Minisymposium on parallel computing.
- SIAM Annual Meeting AN13: SIAG/SC track
- SIAM PP12: Feb 15-17, 2012, Savannah, GA USA.
- SIAM PP14: Date/Location to be determined at the business meeting at PP12 and held in the period for the charter after this one.

7. How can SIAM help the activity group achieve its goals?

Perhaps the single largest missing element for SIAG/SC is a natural journal for publication of related research. Certainly SIAM-SISC is a related journal and SIAG/SC members publish in it, but SIAM-SISC has not traditionally published much of the SIAG/SC-related research content. Instead SIAG/SC-related content has been published in other venues such as the Supercomputing conference series proceeding and other high performance computing journals. We think this is a function of two things: SIAM-SISC has a tradition of publishing theoretical and small-scale computing results. Also, the time lag between submission and publication of papers in SIAM-SISC is very long (12-18 months) which is not ideal for SIAG/SC-related research since supercomputing is a fast-paced field.

In the past, SIAG/SC officers have discussed this issue with the SIAM-SISC editorial staff and there is interest on their part to accept more content from SIAG/SC-related work. We announced this at the PP10 business meeting, but

there does not (yet) appear to be a surge in large-scale parallel scientific computing research in SISC. We are aware of an effort to create a parallel algorithms and architecture-focused journal through another society. If it happens, this may be a good journal for some elements of the SIAG/SC community, but probably not for all of them.

We do not have specific proposals for how to address this situation, nor is it clear that we need to change it. Rather than changing SIAM-SISC, perhaps another approach would be to consider a new SIAM journal for SIAG/SC-related content, one that focuses on rapid turn-around and shorter papers. Perhaps this could be an online only journal.

8. How can the activity group help SIAM in its general role of promoting applied mathematics and computational science?

SIAG/SC represents the intersection of SIAM with the wider supercomputing and parallel computing communities. Therefore, we can help SIAM understand these communities and recognize opportunities for future interaction.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2010.

Signed
Cynthia Phillips
December 1, 2011